

mixing the motor oil with a phase transfer catalyst in the presence of a base compound;

mixing the motor oil with a solvent to dissolve contaminants from the motor oil into the solvent; and then

separating the solvent from the motor oil.

5. The method of claim 4, wherein the phase transfer catalyst comprises quaternary ammonium salts, polyol ethers, glycols, or crown ethers.
6. The method of claim 4, wherein the phase transfer catalyst comprises ethylene glycol.
7. The method of claim 4, further comprising removing contaminants from the motor oil by distilling the motor oil at a temperature of about 200°C to about 275°C and a pressure of about 100 torr to about 200 torr.
8. The method of claim 4, further comprising removing contaminants from the motor oil by distilling the motor oil at a temperature of about 275°C to about 300°C and a pressure of about 0.05 torr to about 0.2 torr.
9. The method of claim 4, further comprising removing contaminants from the motor oil by distilling the motor oil at a temperature of about 200°C to about 300°C and a pressure of about 0.05 torr to about 200 torr.
10. (Canceled without prejudice) The method of claim 1, further comprising contacting the motor oil with a base compound.
11. The method of claim 4, wherein the base compound is an inorganic or organic base compound.

12. The method of claim 11, wherein the inorganic base compound is selected from the group consisting of sodium hydroxide, potassium hydroxide, and combinations thereof.
13. The method of claim 4, wherein a mixture of the motor oil and phase transfer catalyst comprises about 1 % to about 10 % by weight of the phase transfer catalyst.
14. The method of claim 10, wherein a mixture of the motor oil and base compound comprises about 0.5 % to about 5 % by weight of the base compound in volume of solution.
15. The method of claim 4, further comprising separating the contaminants from the solvent.
16. The method of claim 15, further comprising recycling the solvent.
18. The method of claim 4, wherein separating the solvent from the motor oil comprises extraction.
19. The method of claim 4, wherein separating the solvent from the motor oil comprises flowing the solvent counter to the motor oil within means for extraction.
20. The method of claim 19, wherein means for extraction comprises a mixer, agitated column, non-agitated column, and Karr column.
21. The method of claim 4, wherein the solvent comprises N,N-dimethylformamide.
22. The method of claim 4, wherein the solvent is a polar organic compound.
23. A method for removing contaminants from a petroleum distillate, comprising:

mixing the petroleum distillate with ethylene glycol in the presence of a base compound;

mixing the petroleum distillate with a solvent to dissolve contaminants from the motor oil into the solvent; and then

separating the solvent from the petroleum distillate.

24. The method of claim 23, wherein the petroleum distillate comprises motor oil.

25. The method of claim 23, wherein separating the solvent from the petroleum distillate comprises distilling the petroleum distillate at a temperature of about 200°C to about 275°C and a pressure of about 100 torr to about 200 torr.

26. The method of claim 23, wherein separating the solvent from the petroleum distillate comprises distilling the petroleum distillate at a temperature of about 275°C to about 300°C and a pressure of about 0.05 torr to about 0.2 torr.

27. The method of claim 23, wherein separating the solvent from the petroleum distillate comprises distilling the petroleum distillate at a temperature of about 200°C to about 300°C and a pressure of about 0.05 torr to about 200 torr.

28. The method of claim 23, wherein a mixture of the petroleum distillate and ethylene glycol comprises about 1 % to about 10 % by weight of ethylene glycol.

29. The method of claim 23, wherein a mixture of the petroleum distillate and base compound comprises about 0.5 % to about 5 % by weight of the base compound in volume of solution.

30. The method of claim 23, further comprising separating the contaminants from the solvent.

31. The method of claim 30, further comprising recycling the solvent.

33. The method of claim 23, wherein separating the solvent from the petroleum distillate comprises extraction.
34. The method of claim 23, wherein separating the solvent from the petroleum distillate comprises flowing the solvent counter to the petroleum distillate within means for extraction.
35. The method of claim 34, wherein means for extraction comprises a mixer, agitated column, non-agitated column, and Karr column.
36. The method of claim 23, wherein the solvent comprises N,N-dimethylformamide.
37. The method of claim 23, wherein the solvent is a polar organic compound.
38. A method for removing contaminants from motor oil, comprising:  
mixing the motor oil with ethylene glycol in the presence of an inorganic base compound;  
mixing the motor oil with a solvent to dissolve contaminants from the motor oil into the solvent;  
separating the solvent from the motor oil; and then  
separating the contaminants from the solvent.
40. The method of claim 38, wherein the inorganic base compound is selected from the group consisting of sodium hydroxide, potassium hydroxide, and combinations thereof.
41. The method of claim 38, wherein a mixture of the motor oil and ethylene glycol comprises about 1 % to about 10 % by weight of the ethylene glycol.

42. The method of claim 39, wherein a mixture of the motor oil and base compound comprises about 0.5 % to about 5 % by weight of the base compound in volume of solution.
43. The method of claim 38, further comprising recycling the solvent.
45. The method of claim 38, wherein separating the solvent from the motor oil comprises extraction.
46. The method of claim 38, wherein separating the solvent from the motor oil comprises flowing the solvent counter to the motor oil within means for extraction.
47. The method of claim 46, wherein the means for extraction comprises a mixer, agitated column, non-agitated column, and Karr column.
48. The method of claim 38, wherein the solvent comprises N,N-dimethylformamide.
49. The method of claim 38, wherein the solvent is a polar organic compound.
50. A method for removing contaminants from motor oil, comprising:  
mixing the motor oil with a phase transfer catalyst in the presence of an inorganic base compound;  
mixing the motor oil with N,N-dimethylformamide to dissolve contaminants from the motor oil into the solvent;  
separating the N,N-dimethylformamide from the motor oil; and then  
separating the contaminants from the solvent.
51. The method of claim 50, wherein the inorganic base compound is selected from the group consisting of sodium hydroxide, potassium hydroxide, and combinations thereof.

52. The method of claim 50, wherein the phase transfer catalyst comprises quaternary ammonium salts, polyol ethers, glycols, or crown ethers.

53. The method of claim 50, wherein the phase transfer catalyst comprises ethylene glycol.

### REMARKS

This is intended as a full and complete response to the Final Office Action dated September 3, 2002, having a shortened statutory period for response set to expire on December 3, 2002. Claims 4-16, 18-31, 33-38, 40-43, and 45-53 are pending in the application. Applicants have canceled claim 10 without prejudice to correct matters of form. Pursuant to the Examiner's request, Applicants have enclosed herewith a copy of the PTO form 1449 corresponding to the IDS filed on February 20, 2001. Please reconsider the claims pending in the application for reasons discussed below.

Claims 4-16, 18-31, 33-38, 40-43 and 45-53 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-14 of U.S. Patent No. 6,319,394. Applicants have enclosed herewith a Terminal Disclaimer regarding U.S. Patent No. 6,319,394. Accordingly, withdrawal of the rejection and allowance of the claims is respectfully requested.

Claims 4-16, 18-31, 33-38, 40-43 and 45-53 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,238,551. The Examiner states that the Terminal Disclaimer submitted by Applicants on November 30, 2001 to overcome the double patenting rejection over U.S. Patent No. 6,238,551 was not proper because the attorney is not of record. Applicants respectfully disagree. Applicants previously filed a Power of Attorney to N. Alexander Nolte on April 9, 2001, making Mr. Nolte a registered attorney of record. Copies of the Power of Attorney and the Terminal Disclaimer submitted by N.

Alexander Nolte are enclosed with this response. Accordingly, withdrawal of the rejection and allowance of the claims is respectfully requested.

Claims 4, 5, 10, 11, 12, 14, 15, 16 and 22 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Habiby et al.* (U.S. Patent No. 4,021,333). Pursuant to a telephone interview with the Examiner on October 28, 2002, Applicants submit that the base compound disclosed in *Habiby et al.* is not present during a subsequent extraction step where the organic liquid extractant, which the Examiner equates to Applicants' phase transfer catalyst, is added. *Habiby et al.* discloses a two-part distillation/extraction process. First, *Habiby et al.* discusses Step A, which is the distillation part of the process. (See, *Habiby et al.*, at col. 1, lines 58-62.) The next step in the process of *Habiby et al.*, Step B, is the recovery of the distillate during the distillation part of the process. (See, *id.*, at col. 2, lines 24-25.) *Habiby et al.* then discloses Step C, which involves the extraction of impurities from the distillate with an organic liquid extractant. (See, *id.*, at col. 2, lines 37-39.) Finally, Step D is the part of the extraction process which removes the extractant and impurities from the distillate. (See, *id.*, at col. 3, lines 23-24.)

*Habiby et al.* further discloses adding and removing a diluent as an optional step prior to Step A. (See, *id.*, at col. 3, lines 35-39.) *Habiby et al.* further discloses an optional step of heating the used oil with an aqueous solution of a strongly alkaline material (before the optional diluent removal step). (See, *id.*, at col. 3, lines 56-59.)

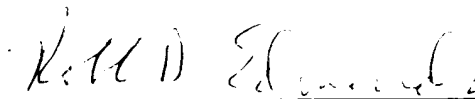
Applicants respectfully submit that the "strongly alkaline material" of the additional preliminary step, which the Examiner equates with the base compound of claim 4 and its dependent claims, is not present during Step C when the organic liquid extractant is added. Therefore, *Habiby et al.* does not teach, show, or suggest a method for purifying motor oil comprising mixing the motor oil with a phase transfer catalyst in the presence of a base compound, as recited in claim 4 and its dependent claims 5, 11, 12, 14, 15, 16, and 22. Withdrawal of the rejection and allowance of the claims is respectfully requested.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion

of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed invention. Having addressed all issues set out in the Office Action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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